WHAT IS CLAIMED IS:

1. An EUV exposure apparatus for scanning and exposing a pattern of an original plate to a substrate in a vacuum, the apparatus comprising:

an original plate stage for moving the original plate;

a substrate stage for moving the substrate;

an electromagnetic motor disposed in the vacuum and driving at least one of the original plate stage and the substrate stage; and

cooling means for cooling said electromagnetic motor an amount sufficient to prevent overheat damage of said electromagnetic motor resulting from heat generated by said electromagnetic motor.

2. An EUV exposure apparatus according to Claim 1, wherein said cooling means cools said electromagnetic motor by circulating a coolant.

3. An EUV exposure apparatus according to Claim 2, wherein said coolant has a temperature lower than a temperature of at least one of the original plate and the substrate.

4. An EUV exposure apparatus according to Claim 1,

wherein at least one of the original plate stage and the substrate stage is out of contact with a heat generating portion of said electromagnetic motor.

5. An EUV exposure apparatus according to Claim 4, wherein at least one of the original plate stage and the substrate stage includes a fine movement mechanism for driving the at least one of the original plate and the substrate in a non-contact manner by utilizing electromagnetic forces.

6. An EUV exposure apparatus according to Claim 5, wherein said fine movement mechanism is supported to for driving the original plate stage or the substrate stage in a non-contact manner.

7. An EUV exposure apparatus according to Claim 1, wherein a heat generating portion of said electromagnetic motor is out of contact with at least one of a guide for at least one of the original plate stage and the substrate stage, a measuring device for measuring a position of at least one of the original plate stage and the substrate stage, an optical system for adjusting an EUV exposure light, and a chamber for maintaining the vacuum therein.

8. An EUV exposure apparatus according to Claim 1, wherein a measuring optical path of said measuring device for measuring a position of at least one of the original plate stage and the substrate stage is disposed in the vacuum.

9. An exposure apparatus for exposing a pattern to a substrate in a vacuum, the apparatus comprising:

a substrate stage for moving said substrate;

an electromagnetic motor disposed in the vacuum and driving said substrate stage; and

cooling means for cooling said electromagnetic motor an amount sufficient to prevent overheat damage to said electromagnetic motor caused by heat generated by said electromagnetic motor.

10. A device manufacturing method comprising the steps of:

preparing an exposure apparatus according to any one of Claims 1 to 9, and

exposing a pattern to a substrate by employing said exposure apparatus.